VAA-Weekly-Progress

03/11-03/25

Context

- Last week, completed labelling Visual Keypoints
- Experimented with similar species metrics (limb ratio, centroid variation, DINO)
- Poster deadline for research conference is on April 8

Goals

- Label Biologically defined antelopes - Everyone
- Continue experiments with species similarity
- Rough draft of poster - Medha
- Quick note (we can test on all antelopes (200 images) instead of the 100 being used now - initially we planned on setting aside half the images for finetuning)

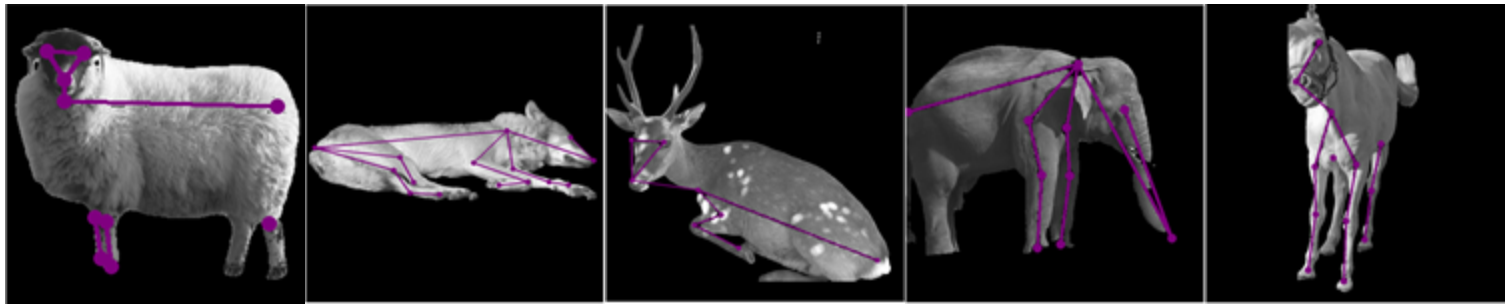
VIP

PURDUE UNIVERSITY

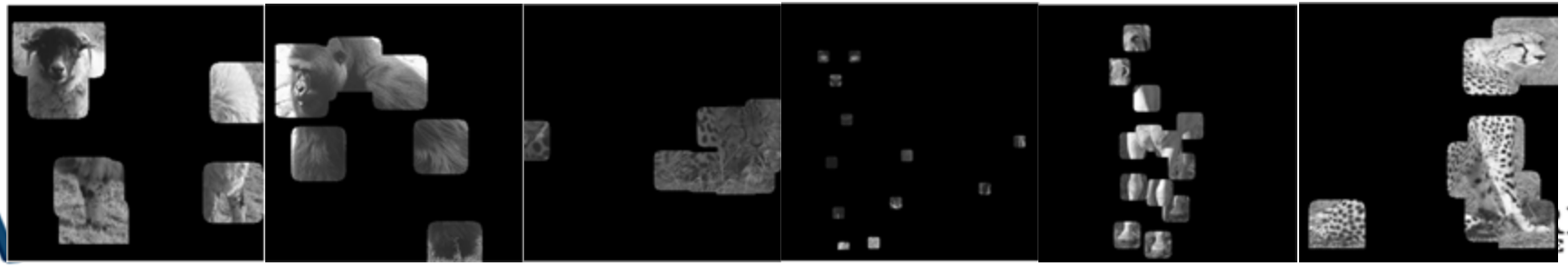
Overlaying KP Skeletons & Masking KP Locations

Hypothesis: Modifying the images with semantics from the labeled key points for the image(either through overlaying the skeleton or only showing the area around the keypoints), could allow the DINO & SD models to generate features that are more meaningful to the keypoint estimation task

Overlaying KP Skeletons:



Masking KP Locations(drew 10 pixel radius circles around each keypoint location for the mask cutouts)**:**



Generated Top 10 Similar Species: Random & Humans

Hypothesis:

We should use a random list of 10 animals as a baseline to see how a model trained on this random list performs to gauge how meaningful the AP and AR results of the models trained on datasets from similarity metrics(centroid variance, DINO+SD features, limb ratios) are.

We could generate a top 10 similar species list based on what species humans(in this case members of the vip team) think look similar to antelopes, to offer either proof that just looking at the visual features(either by humans or extracting them with DINO & SD) is not sufficient to evaluating the similarity of species for keypoint estimation, or that there is something wrong with how features are being extracted and compared with DINO & SD.

Generated Lists: On Next Slide

Top 10 Similar Species Comparison(DINO+SD, Random, Human)

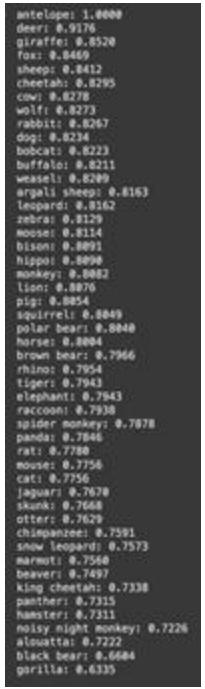
Random

1. Tiger
2. Wolf
3. Squirrel
4. Panda
5. Deer
6. Fox
7. Brown Bear
8. Spider Monkey
9. Rhino
10. Mole

Human Choice

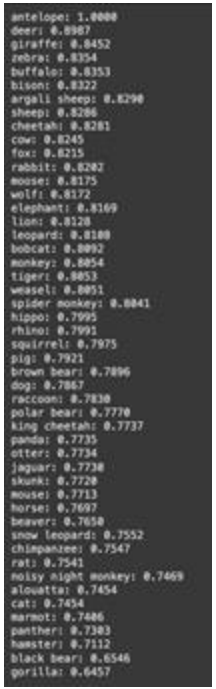
1. Deer
2. Moose
3. Zebra
4. Horse
5. Giraffe
6. Argali Sheep
7. Sheep
8. Cow
9. Bison
10. Buffalo

KP Overlay DINO+SD eval w/ cosine sim.



KP Overlay DINO+SD eval w/ knn

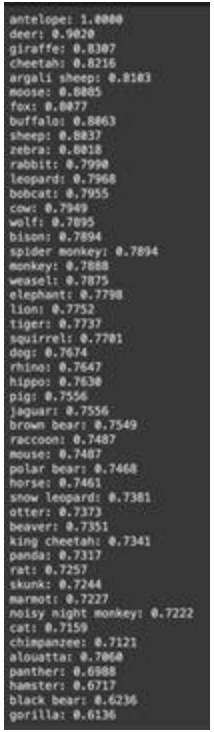
KP Patches DINO+SD eval w/ cosine sim.



KP Patches DINO+SD eval w/ knn

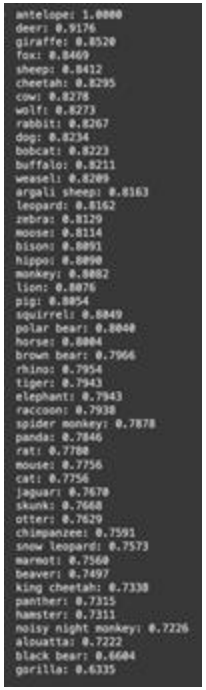
Top 10 Similar Species Comparison(DINO+SD, Random, Human)

Dino+SD eval w/ Cosine sim.



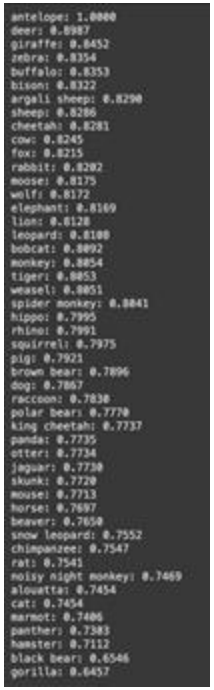
Dino+SD eval w/ knn

KP Overlay DINO+SD eval w/ cosine sim.



KP Overlay DINO+SD eval w/ knn

KP Patches DINO+SD eval w/ cosine sim.



KP Patches DINO+SD eval w/ knn

Fixing Testing Problem With DINO+SD Eval

Problem: Accidentally used the AP and AR scores of the RTMPose model trained on similar species(from DINO+SD features) given when RTMPose is evaluated on the validation set, which is wrong as that includes the animals from similar species list and not antelopes.

Fix: Evaluate it only on the Antelope images from AP10K(use the testing set which only contains the antelope AP10K images).

AP Comparison of RTMPose Trained on Data From:

	Full AP-10k redistributed	Top 10 Dino+SD Full AP-10k Cosine Similarity	Top 10 Dino+SD Full AP-10k KNN	Top 10 KP Overlay Dino+SD Cosine Similarity	Top 10 KP Overlay Dino+SD KNN	Top 10 KP Patches Dino+SD Cosine Similarity	Top 10 KP Patches Dino+SD KNN	Top 10 From Humans	10 Random Species
coco/AP:	0.818	0.791	0.785						
coco/AP .5:	0.969	0.967	0.967						
coco/AP .75	0.884	0.857	0.862						
coco/AP (M):	0.799	0.680	0.753						
coco/AP (L):	0.817	0.793	0.784						

AR Comparison of RTMPose Trained on Data From:

	Full AP-10k redistributed	Top 10 Dino+SD Full AP-10k Cosine Similarity	Top 10 Dino+SD Full AP-10k KNN	Top 10 KP Overlay Dino+SD Cosine Similarity	Top 10 KP Overlay Dino+SD KNN	Top 10 KP Patches Dino+SD Cosine Similarity	Top 10 KP Patches Dino+SD KNN	Top 10 From Humans	10 Random Species
coco/AP:	0.834	0.812	0.809						
coco/AP .5:	0.975	0.971	0.971						
coco/AP .75	0.892	0.873	0.873						
coco/AP (M):	0.817	0.717	0.783						
coco/AP (L):	0.834	0.815	0.810						

Poster Timeline

- Poster session is on April 8 (2 weeks from now)
- We need to have results for the keypoint definition experiments by next week, and also have a finished poster draft by next week for review
- Poster Rough draft in Box

Personal Progress

Medha

- Created a rough draft of the poster
- Labeled 39 images with biological keypoints

Claire

- Labelled 49 images using biological definitions

Parth

- Labeled 20 Images of biological definitions (need to continue; will end up labeling my share of it)
- Worked on drafting species similarity methodology
- Worked on drafting centroid variation algorithm